

# SUMMARY

OF THE

## IMPROVEMENTS AND DISCOVERIES

IN THE

### MEDICAL SCIENCES.

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#### ANATOMY AND PHYSIOLOGY.

1. *Secretions derived from Venous Blood alone: a true Portal System in the Kidney.*—In an able paper in the "*Dublin Journal of Medical Science*," Dr. ALDRIDGE brings forward the view that a true portal system exists in the kidney, and that the peculiar secretion elaborated by that gland is, like the secretion of the liver, derived from venous blood, as asserted by Mr. Bowman in the "*Physiological Transactions*" of the past year. This view is so novel, and, at the same time, so well entitled to demand extended publicity, that its merits may be sufficiently canvassed, we do not deem it necessary to make any apology for introducing copious extracts, comprising the main points of the argument in the following columns. Dr. Aldridge states that in 1839 he remarked on "the improbability of the opinion generally entertained that urine is secreted from arterial blood. I asked why should the kidney differ from the other great excretories in this particular? The liver and lungs secrete from venous blood; and is it not reasonable to think that in every instance the means of depuration should be implied to the *impure fluid*?..... Jacobson has discovered that in fishes and reptiles the urine is secreted by venous blood. Is it likely so great a difference could exist between the performance of this function in contiguous groups of all vertebrate animals?

"Mr. Bowman, in a paper published in the '*Philosophical Transactions*' during the past year, has ascertained that the kidney is furnished with a *true portal system*; and that urine (like the bile) is secreted, in part, at least, from blood traversing, at the time, a second set of capillaries.

"According to him the exceedingly tortuous and convoluted urinary conduits terminate at their final extremities, each by a contracted neck, which conducts into a little chamber or cyst. In this cyst is contained the true glandule of Malpighi, which consists of a tuft or coil of capillary blood-vessels, totally naked, which originates in one of the ultimate branches of the renal artery, and terminates in an efferent vessel. Several of these latter form, by their anastomosing ramifications, the plexus that surrounds each urinary conduit and tubule; the urinary conduits are lined by thick epithelium, and their necks are furnished by vibratile cilia.

"All the blood of the renal artery," says Mr. Bowman, "(with the exception of a small quantity distributed to the capsule, surrounding fat, and the coats of the larger vessels,) enters the capillary tufts of the Malpighian bodies; thence it passes into the capillary plexus surrounding the uriniferous tubes, and it finally leaves the organ through the branches of the renal vein.

"Thus, there are in the kidney *two perfectly distinct systems of capillary vessels*; the 1st, that inserted into the dilated extremities of the uriniferous tubes, and in immediate connection with the arteries (the Malpighian bodies); the 2nd, that enveloping the convolutions of the tubes, and communicating directly with the

veins. The efferent vessels of the Malpighian bodies that carry the blood between these two systems, may collectively be termed the *portal system of the kidney*."

The former, which may be styled the Malpighian capillary system, is made up of as many parts as there are Malpighian bodies. These parts are entirely isolated from one another; and, as there is no inosculation between the arterial branches supplying them, the blood enters each in a direct stream from the main trunk. This capillary system is also highly remarkable; indeed, stands alone among similar structures, it being bare. The secreting tubes of the kidney, like those of all other glands, are, strictly speaking, an involution of the outer tegument of the frame; their interior is, in one sense, the outside of the body, their walls intervene between the vessels and the exterior, and, as it were, cover them in. But here is a tuft of capillaries extruded through the wall of the tube, and lodged in a dilatation of its cavity, uncovered by any structure; bare, indeed, yet screened from injury in its remote cell with infinite care and skill! Each separate part also of this system has but one afferent, and one efferent channel, and both of these are exceedingly small compared with the united capacity of the capillary tuft. The artery, in dividing, dilates; then follow branches which often exceed it in size, and which gradually break up into the finest. The efferent vessel does not usually even equal the afferent, and in size is often itself a capillary. Hence must arise a greater retardation of the blood in the tuft than occurs probably in any other part of the vascular system; a delay that must be increased by the tortuosity of the channels to be traversed.

"The other system of capillaries, or that surrounding the uriniferous tubes, corresponds, in every important respect, with that investing the secreting canals of other glands. It is well known to anatomists, and therefore does not require to be described at any length. Its vessels anastomose with the utmost freedom on every side, and lie on the deep surface of the membrane that furnishes the secretion.

"Mr. Bowman has been led to speculate on the uses of these two sets of capillaries that he has proved to exist in the kidneys of all animals; and he brings forward much ingenious argument to show that the uses of the Malpighian bodies is to secrete the watery portion of the urine. The analogy between the urinary conduits and the secreting part of other glands, leaves very little doubt of these organs being the essential secerning apparatus. But the naked capillary coil that constitutes a Malpighian body, placed in a cavity closed on every side, except where it communicates with the conduits, composed of vessels much greater in their aggregate capacity than the afferent or efferent vessels, presents an apparatus admirably adapted for excessive perspiratory action; and when, in addition, we find cilia arranged to facilitate the current of a fluid, we can scarcely deny that Mr. Bowman's hypothesis is a very feasible one."—*Lancet*, 29th April, 1843.

2. *Congenital closure of the descending Aorta*.—Dr. Wise relates in the *Bengal Transactions* the following example of the obliteration of the principal arterial trunk of the body, without its producing any apparent marked effect on the size or strength of the parts upon which the artery was distributed from the circulation being carried on by anastomosing vessels.

A strong middle-aged native, while walking, suddenly fell down, and expired. Dr. Rae, who gave Dr. Wise this preparation, examined the body, and found a large quantity of blood in the cavity of the chest. In following the course of the aorta, which was found enlarged; after leaving the heart, and giving off the innominate, and the left carotid and subclavian arteries, it suddenly contracted for a line in breadth, as if a ligature had been passed tightly round it; and on examination it was found there to be completely imperious under the ductus arteriosus, which was also closed. Immediately under this point the aorta appeared of its natural size, into which several enlarged arteries poured in their blood. The left ventricle was much thicker in its parietes than natural; and on laying open the enlarged ascending aorta immediately

after its leaving the heart, it was found torn in its internal coat for an inch and a half, commencing a short distance above the semi-lunar valves, and extending obliquely upwards. By this torn part, blood had been forced between the cellular and muscular coats and into the cavity of the chest, causing the sudden death of the individual.

Where the left carotid artery divided into the external trunk, an incipient aneurism appeared, in the form of a semicircular swelling. On examining this more carefully, it seemed to be formed by the blood forcing out the arterial pariete without having destroyed the fibrous coat. This is by no means a solitary instance, as Hodson has delineated one of the same kind; and Dr. Wise believes a more extended and careful examination will prove that this is the usual manner in which aneurisms commence. The enlargement of the ascending aorta is another example of the same kind.

The circumference of the different vessels in the case under review, are as follows:—

The greatest external circumference of the aorta near its origin in inches	4.75
Aorta, after giving off the left subclavian	1.15
— immediately under the strictured ditto	2.72
Left subclavian ditto	1.45
— carotid ditto	.52
Innominate ditto	1.50

Dr. Wise conceives that the closure of the aorta in this case was congenital.

3. *Malformation of Heart*—this organ consisting of only two cavities—no cyanosis.—A child in the Foundling Hospital of Paris was observed to be often affected with great difficulty of breathing, with a quick dry cough, and especially when it drank, a state threatening suffocation ensued. The child was large, and externally well formed; but it died in eleven days, apparently of umbilical phlebitis.

On opening the pericardium, the heart was found altered from its natural form, being bag-shaped, or rather rounded at the place of the apex, and to consist of only one auricular and one ventricular cavity. Viewed from the front, the pulmonary artery was quite hidden by the aorta, which originated from the right and anterior portion of the ventricle, and by the auricular appendices, for of these there were two well-formed, though only one auricle. A line directed obliquely backwards, and from right to left along the base of the ventricle, would have crossed first the opening of the aorta, next that of the pulmonary artery, and lastly, the auriculo-ventricular opening. The spleen was large, but none other of the viscera or portion of the circulatory apparatus presented any anomaly. No cyanosis had been noticed during life.—*Archives Gen. de Med.*, Feb. 1843.

4. *Movements of the Heart*.—M. Monod had an excellent opportunity of examining the movements of the heart in an infant, which was born with thoracic ectopia, the parietes of the thorax being deficient, and the heart being visible to the eye. The pericardium also was wanting. The child lived 14 hours, but during this time many important facts were ascertained.

The contractions of the ventricles of the heart did not take place over its whole surface at the same moment, but progressed from the base to the apex; at the same time the organ became of a pale colour, its surface wrinkled, a movement of twisting from right to left was observed, and lastly, the apex of the heart was carried upwards and forwards.

The diastole presented the same phenomena, but in an opposite order. The heart relaxed suddenly; then the ventricular cavity became filled with blood, swelled out, became elongated, and the apex was projected downwards. If the total duration of these two movements were divided into four equal spaces of time, it would be seen that the systole occupied three of these, the diastole only one.

The contractions of the auricles commenced in their free appendices; but in

them the duration of the contraction and relaxation were in the inverse ratio of those of the auricles. The systole, or contractions, occupied only one-fourth of the time; the diastole, or relaxation, three-fourths.

With regard to the order of the succession of movements, both ventricles contract at the same time, and both relax together; it is the same with the auricles. There are two periods of repose; one, which is the shortest, is between the first and second sound; the other, which is the longest, between the second sound and the first.

In this case the maximum of intensity of the first sound did not occur at the base of the ventricles, but at the middle of their fleshy walls; and M. Monod thinks that it was caused by the shock of the walls of the ventricles against the internal fleshy columns at the moment of contraction. As to the second sound, he thinks it was due to the return of the wave of blood against the sigmoid valves.—*Fd. Med. & Surg. Journ.* July 1843, from *Bullet. de l'Acad. de Med.* 7th Feb. 1843.

5. *Facts Relative to the Corpuscles of Mammiferous Blood.* By MARTIN BARRY, M. D.—No observer can learn the structure of the blood-corpuscles, who does not carefully investigate their mode of origin, and patiently follow them through all their changes. Where are these changes to be seen? Not in blood taken from large vessels, which are merely channels for conveying it, but in that contained, and almost at rest, in the capillaries,—and especially in the capillary plexus and dilatations; a remark which I believe is new, though many figures published by myself in the *Philosophical Transactions* show the observations on which it is grounded to have been long since made. But there is another source from which my information has been obtained—the large cells in the ovum. From these the corpuscles of the blood seem to have descended; and they undergo changes essentially the same.

1. The mammiferous blood-corpuscle, like one of the cells of the ovum, is at first a disc, or what is now called a "cytoblast," *i. e.* a cell-germ. It is not a flattened vesicle or cell. Like other discs or cytoblasts, however, it may and does become a cell; but then it is no longer flat. In the blood-disc you see a central, colourless, concave portion, around which lies the red colouring matter.

2. As usually met with, the blood-disc is *round*, with the exception of two or three instances in which, from the observations of Mandl in France, and Gulliver in this country, it has been discovered to be *elliptical*. I have since found that even in mammals, where the blood-disc is usually met with round, *its original form is elliptical*. I have seen this to be the original form of the blood-disc in man.

3. The discs first become round, continuing flat; subsequently they pass into an orange-shape, and lastly become globular. They also very much increase in size.

4. Along with these alterations in the form and size of the blood-discs, there takes place another change. Instead of a mere concavity, there is now seen a colourless, pellucid, semi-fluid substance; which, as the corpuscle becomes orange-shaped, is found to be, not in the centre, but *on one side*. It is the nucleus of the corpuscle—the corpuscle itself having become a cell. This pellucid substance or nucleus divides into and gives off globules. Each globule, appropriating to itself new matter, becomes a disc; and each disc, undergoing changes like the first, gives origin to other discs, a group of which constitutes the colourless corpuscle of the blood; for, with the changes now mentioned, the red colouring matter is consumed. Thus, as the red pass into the colourless corpuscles, there must exist all intermediate stages; between them no line of distinction can be drawn.\*

\* The colourless corpuscles in other vertebrata, for instance the batrachians, being much smaller than their red corpuscles, cannot be these red corpuscles in an altered state. Nor is any such change to be expected here. The red corpuscles usually seen circulating in these animals are not, as in mammalia, *discs*, but *nucleated cells*. Some

5. The corpuscles of the blood are propagated by means of parent cells. A parent cell has its origin in a colourless corpuscle; this colourless corpuscle being an altered disc. As the parent cell is forming, the new discs within it gradually become red, and are at length liberated to give origin in like manner to new discs, or to be appropriated in some other way.

6. From sect. 4. it will be seen that the disc, or so-called "cytoblast," is originally a pellucid globule; which globule therefore is the true cell-germ.

7. Sometimes the quantity of the pellucid substance in the blood-cell is very much increased. This takes place at the expense of the red colouring matter which surrounds it. The blood-corpuscles, now cells, I have seen in various parts collected until the capillaries were completely filled with them, and until they had become pressed together into many-sided objects. I have met with vessels at the edge of the crystalline lens, some parts of which presented no other than the pellucid semifluid substance, arisen in the manner now described, and no longer contained within the cells.

8. This originally colourless substance, derived from the nuclei of blood-cells, and nearly filling the capillaries as I have found it, appears to constitute the essential part of coagulable lymph, to organize the same, and to give origin to the tissues, &c. in the manner I have elsewhere described. It seems to be this same originally colourless substance, derived from the nuclei of blood-cells, that forms the exudation-corpuscles of authors, the fibres of false membrane, and the filaments in coagulating blood—filaments which, as I have shown, here and there arise while this substance is still within the cells.—*Lond. Edin. and Dub. Philos. Mag.*, May 1843.

6. *Influence of Asphyxia on the Secretion of Bile.*—Professor BOUSSON of Montpellier, has made some experiments to ascertain the influence of asphyxia on the secretion of bile, and the results prove that slow asphyxia in producing venous congestion of the liver, far from diminishing the biliary secretion as asserted by Bichat, on the contrary, strikingly increases it. The physical characters of the bile are also altered, this fluid assuming a darker colour, becoming sanguinolent, or even black; and its consistence is also increased, which characters appertain to highly carbonized bile. This change is explained by the fact that the lungs and liver are the two outlets by which carbon is eliminated from the system; and the gradual suspension of the function of the lungs in slow asphyxia, produces an exaggeration of the supplementary function performed by the liver.—*Journal de la Soc. Méd. Prat. de Montpellier*.

7. *Absorption of Iodine.*—M. LEON BROUSSE has tested the urine of several patients who had been treated for hydrocele by the iodine injection. In every instance he was readily enabled to discover the metalloid in the urinary secretion by the third or fourth day after the operation, and in one instance, at least, as early as the second day. In this case, that of a Spaniard, forty years of age, the scrotum continuing swollen, and evidently containing fluid five weeks after the operation, it was punctured with a lancet, and a sanguinolent fluid evacuated, which, on being subjected to the usual tests, yielded evident indications of the presence of iodine.—*Journ. de Chimie Méd.* Dec., 1842.

of these nucleated cells, however, give origin to discs having very much the same form, size, and general appearance as the blood-discs of the mammalia. In the frog I saw such discs passing into the state of colourless globules, which, acted on by acetic acid, presented just the same appearance as the colourless corpuscles of the human subject.